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DEVICE FOR DEFINING A HANDLE IN A TUBULAR COVERING FOR A FOOD PRODUCT

This application claims the benefit of Non-Provisional Application No. 10/339,910, filed January 10, 2003, which claims the benefit of Provisional Application No. 60/347,477 filed January 11, 2002.

BACKGROUND OF THE INVENTION

This invention pertains to a food packaging apparatus. More particularly, this invention pertains to a device for defining a loop handle in a tubular covering, such as an expandable mesh covering, for a food product, such as, but not limited to a meat product.

It is known in the food packaging industry to vacuum wrap consumer portions of food products, especially meat products. It is also known in the art to use expanded mesh coverings for food product during processing. To facilitate carrying, it has become customary to provide a tubular cover, such as an expanded plastic mesh cover for the vacuum wrapped food product. Further, this tubular mesh cover has a loop in one end in order to define a handle. Presently, formation of this loop handle is accomplished manually by hand. In this regard, a worker will bag the food product in the tubular expanded mesh covering, gather, or compress, an extended portion back on itself and then clip the loop, with a conventional clipping apparatus, in order to secure the loop. Conventional clipping machines attach two clips, one to secure the bottom of the next covering to be formed and one to secure the loop handle. The conventional clipping machine then cuts the tubular covering between these two clips. Manual loop formation can limit the rate of production. What is needed is an apparatus for defining a handle in a tubular covering for a food product.

BRIEF SUMMARY OF THE INVENTION

The apparatus of the present invention is a device for covering a food product in a tubular covering, such as an expanded mesh plastic covering, which has a loop handle defined in one end of the tubular covering. As the food product proceeds through the apparatus, a handle is formed for the covering of the next food product and the open end of the tubular covering containing the food product is clipped, thereby securing the food product within the tubular covering. In the preferred embodiment, as the food product enters the apparatus, it is weighed so that a tag (containing certain information regarding the food product as will be known and appreciated by those skilled in the art) can be printed and secured in the loop handle defined in the portion of the tubular member that will receive the food product. While the apparatus described, and illustrated herein has been adapted specifically for bagging vacuum wrapped turkeys, it will be appreciated by those skilled in the art that the apparatus can be adapted to define a loop handle in a tubular covering for other poultry products, other meat products and indeed other food products. Indeed, it will be appreciated by those skilled in the art that the device has utility in bundling non-food products as well.

The apparatus of the present invention includes a frame for supporting the various assemblies that comprise the apparatus and for engaging a support surface such as a floor. The frame also includes various guards and shields designed and intended to prevent an operator of the apparatus, or other individuals in close proximity to an operating apparatus, from being injured as a result of contact with moving components of the apparatus. Further, the various components of the apparatus of the present invention are preferably pneumatically driven and are controlled through a series of air valves, controlled by a programmable logic controller, PLC, as is conventionally known in the art. However, while operation of the apparatus by a PLC is preferred, it will be appreciated that the operations

could be triggered selectively, and sequentially by an operator toggling a series of switches. While selective operation of the apparatus would not be the preferred embodiment, such is certainly within the scope of the present disclosure.

The apparatus of the present invention includes a conveyor belt, preferably motor driven, which conveys the food product from a production line and into the slide area or chute. An initial conveyor stand and associated scale can be provided for weighing product prior to introducing the product into the slide area. While the conveyors are illustrated as being motor driven, those skilled in the art will recognize that other actuators, such as rotary actuators, could be utilized. It is anticipated that the conveyor would intersect a production line allowing a worker to remove a food product from the production line, weigh the product, if weight information is desired, and feed the food product onto the conveyor of the apparatus. The chute is a substantially tubular member which has the tubular covering expanded on the exterior of the chute, and positioned with respect to the distal end of the chute such that the food product will engage the tubular covering and thereby be covered by the tubular covering as the food product exits the chute. Positioned proximate the distal end of the chute is a voider assembly defined by a stationary set of voider gates and a moveable set of voider gates. Each set of voider gates includes a top voider plate and a bottom voider plate, each voider plate having an opening that is adapted to be positioned so as to substantially register with the opening defined by the diameter of the chute. The stationary set of voider gates is proximate the distal end of the chute. When in the retracted position, the moveable set of voider gates is proximate the stationary set voider gate. As will be explained in greater detail below, the openings in the top and bottom voider plates include cooperating bites that cooperate, and register, when the voider plates are closed so as to gather the tubular covering into a compressed cord.

Further, the apparatus of the present invention includes a handle formation assembly for engaging the compressed cord of tubular covering and forming the compressed cord into a loop handle. A clipper device, carried by the frame of the apparatus of the present invention rotates into a position to engage the handle formation assembly, and the engaged

compressed cord of tubular covering and secures two clips to the cord, one to secure the bottom of the tubular covering for the previously processed food product, and one to secure the loop handle, (and tag), for the tubular covering in preparation of receiving a subsequent food product to be covered. Further a clipping knife severs the compressed cord of tubular covering at a point disposed between the two securing clips. A product restraining assembly is provided to capture and restrain the food product as it passes through the voider gate assembly, position the covered food product for clipping and to release the food product upon completion of the apparatus's handle formation and clipping cycle.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

The above-mentioned features of the invention will become more clearly understood from the following detailed description of the invention read together with the drawings in which:

Figure 1 is a plan view of the device of the present invention showing the moveable voider in the extended position;

Figure 1A is a partial perspective view of the chute which receives product and directs the product into the apparatus;

Figure 2 is also a plan view of the device of the present invention showing the movable voider in the retracted position;

Figure 3 is a side elevation view of the present device, with portions, such as safety shields and covers, removed for clarity of view;

Figure 3A is a detailed enlargement of the area within circle 3a in Figure 3;

Figure 4, inclusive of Figures 4A, 4B and 4C, is a flow diagram showing the operation of the device of the present invention;

Figure 5 is an elevation view, with certain elements removed for clarity of view, showing the clipper device in the rest position;

Figure 5A is an elevation view, with certain elements removed for clarity of view, showing the clipper device in the rotated, or engaged position;

Figures 6A – 6E is a rear elevation view of the handle formation assembly showing the various stages of its actuation;

Figures 7A and 7B are elevation views of the voider gates in the open position in 7A and in the closed position in 7B;

Figures 8A – 8C are plan views of the product restrainer showing the three main positions of the product restrainer;

Figure 9 is a side elevation view isolating the chute showing the expanded mesh covering in place on the chute;

Figure 10 is a partial front perspective view illustrating the handle formation assembly in the fully extended position, with the handle forming jaw cover retracted;

Figure 11 is a partial front perspective view of the detail shown in Figure 10 illustrating the handle formation assembly fully extended and the handle forming jaw member engaged with the mesh covering material and the jaw cover extended;

Figure 12 is a partial front perspective view of the detail shown in Figure 11 midway during the step of rotating the handle formation jaw;

Figure 13 is a partial front perspective view of the detail shown in Figure 12 upon completion of the step of rotating the handle formation jaw;

Figure 14 is a partial front perspective view of the detail shown in Figure 13 after the jaw cover has been retracted.

Figure 15 is a partial front perspective view of the detail shown in Figure 14 illustrating rotation of the clipper device towards the engaged, or clip, position;

Figure 16 is a partial front perspective view of the detail shown in Figure 15 illustrating the clipper device in the engaged, or clip, position;

Figures 17A and 17B are perspective views of the clipping punches and clipping dies utilized by the clipper device of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

An apparatus for defining a loop handle in a tubular covering for a food product is disclosed. The apparatus, illustrated in the various figures, is designated as **10** in the figures. The apparatus **10** is a device for covering a food product in a tubular covering, such as an expanded mesh plastic covering, which has a loop handle **12** defined in one end of the tubular covering. Further, the apparatus **10** forms the loop handle **12** in the tubular covering **15**. Those skilled in the art will recognize that, while the apparatus **10** is described and illustrated herein has being adapted specifically for bagging vacuum wrapped whole turkeys, it will be appreciated by those skilled in the art that the apparatus can be adapted to define a loop handle **12** in a tubular covering **15** for other poultry products, other meat products, other food products, and for non-food products. Before an initial food product is introduced into the apparatus **10**, the apparatus is operated for a cycle in order to form an initial handle loop. A complete product cycle is then defined by introduction of a product into the mesh covering, the open end, i.e., the end of the mesh covering opposite the handle loop, is secured and a loop handle is formed in the covering for the next food product. In other words, as the food product **16** proceeds through the apparatus **10**, the food product **16** engages the mesh covering, the end of which is secured by a loop handle **12** which is formed in the covering, the apparatus **10** secures the open end of the tubular covering containing the food product **16**, thereby securing the food product **16** within the tubular covering **15** and simultaneously forms a loop handle **12** for a subsequent food product. If desired, a food product **16** can be weighed prior to being processed by the apparatus **10**. In this regard, the food product **16** is

weighed on a scale **20**, and if desired a tag (containing certain information regarding the food product as will be known and appreciated by those skilled in the art), dispensed by tag dispenser **22**, can be printed and secured in the loop handle **12** defined in the portion of the tubular covering **15** that will receive the food product **16**. While the scale **20** can be supported by the same framing as the balance of the apparatus **10**, in the preferred embodiment, the scale **20** is supported by a discrete frame **23** so as to substantially isolate the scale from vibration caused by operation of apparatus **10**. As stated above, it will be appreciated that this handle will be formed as the preceding food product travels through the apparatus.

The apparatus **10** of the present invention includes a frame **25** for supporting the various assemblies that comprise the apparatus **10** and for engaging a support surface such as a floor. The frame **25** also includes various guards and shields, (not shown for clarity of view), designed and intended to prevent an operator of the apparatus **10**, or other individuals in close proximity to an operating apparatus, from being injured as a result of contact with moving components of the apparatus. These guards and shields would be readily known to those skilled in the art. Further, the various components of the apparatus **10** are, in the preferred embodiment, pneumatically driven and are controlled through a series of air valves, controlled by a programmable logic controller, PLC, (not shown), as is conventionally known in the art. The PLC would be accessed via a console **30** in order to allow an operator to operate the apparatus **10**. However, while operation of the apparatus **10** by the PLC is preferred, it will be appreciated that the operations could be triggered selectively, and sequentially by an operator toggling a series of switches.

The apparatus **10** includes a conveyor belt **35**, preferably driven by a motor **38**, which conveys the food product **16** from the scale **20**, if weighing of the product is desired, and into the chute area or chute **40**. In one embodiment of operation, the scale **20** and the conveyor belt **35** of the apparatus would intersect a production line (not shown) allowing a worker to remove the food product from the production line, and feed the food product onto the conveyor belt **35** of the apparatus **10**. In the illustrated embodiment, the chute **40** is an

elongated substantially tubular member. During operation of the apparatus **10**, chute **40** would have the tubular covering **15** expanded on the exterior of the chute **40**. Alternately, the chute could simply be defined by a slide having a skeletal frame for receiving the expanded tubular covering **15**. The end of the tubular covering proximate the distal end **42** of the chute **40** is secured by the loop handle **12** which is positioned proximate the distal end **42** of the chute **40** such that the food product **16** will engage the tubular covering **15** and thereby be covered by the tubular covering **15** as the food product **16** exits the chute **40**. This disposition of the bulk tubular covering **15** on the chute **40** is illustrated in Figure 9. Chute **40** is preferably inclined such that the distal end **42** of the chute **40** is lower than conveyor belt **35** so as to allow the food product **16** to travel through the chute **40** by the force of gravity. In order to substantially prevent the food product **16** from rotating as it slides through chute **40**, ridges **43** are disposed within the chute **40**.

Positioned proximate the distal end **42** of the chute **40** is a voider assembly **45** defined by a stationary set of voider gates **48** and a moveable set of voider gates **50**. Each set of voider gates includes a top voider plate **54** and a bottom voider plate **56**, each voider plate **54, 56** having an opening **58** and **60**, respectively, that is adapted to be positioned so as to substantially register with the opening defined by the diameter of the chute **40**. The stationary set of voider gate **48** is proximate the distal end **42** of the chute **40**. When in the retracted position, illustrated in Figure 2, the moveable set of voider gates **50** is positioned proximate the stationary set of voider gates **48**.

The apparatus **10** further comprises a food product restrainer assembly **65**, illustrated in Figure 8, carried by the moveable set of voider gates **50**, for receiving the food product **16** as the food product exits the chute **40** and passes through the voider gates **48** and **50**. The food product restrainer assembly **65** includes a food product slide plate **68**, guide plates **70** in spaced relation from one another and restrainer arms **72**. Restrainer arms **72** have a bend **76** disposed along their length. Rollers **74** follow the contour of the guide plates **70** which are adapted so as to narrow the effective distance between the bends **76** disposed in restrainer arms **72** when the restrainer arms are positioned at their upper and uppermost

positions, seen in Figures 8A, and 8B. This allows the restrainer arms **72** to catch the food product as it exits the chute **40**. The guide plates **70** are further adapted to allow the effective distance between the restrainer arms **72** to increase at its lowermost position, seen in Figure 8C in order to allow discharge of the covered food product. In order to prevent the restrainer arms **72** from rebounding inward during operation of the apparatus **10**, the restrainer arms **72** are caged within rails **78** which are in substantially uniformly spaced relation from guide plates **70** and disposed on the product slide plate **68**. Further, in order to substantially prevent the food product **16** from rotating while it is on the good product restrainer assembly **65**, ridges **79**, which are similar in nature and function to ridges **43** disposed within the chute **40**, are provided on the product slide plate **68**.

It will be appreciated by those skilled in the art that the tubular covering **15** is in an expanded configuration as the food product **16** exits the chute **40** and that the tubular covering **15** extends from the food product to the supply of tubular covering **15** disposed on the exterior of the chute **40**. The apparatus **10** is adapted to compress this extended portion of the tubular member into a compressed cord in order to facilitate formation of the loop handle. In this regard, the openings **58** and **60** in the top and bottom voider plates include bites **80** that cooperate, and register, when the voider plates are closed, to form a narrow channel **82** that acts to gather the tubular covering **15** into a compressed cord **84**. At the beginning of a cycle of operation, the moveable voider gates **50** are in the retracted position, illustrated in Figure 2, and the top and bottom voider plates **54** and **56** are in the open position such that food product **16** can pass through openings **58** and **60**. After the food product **16** has passed through the voider gates, **48** and **50**, the moveable voider gate **50** is positioned to the extended position, seen in Figure 1, and the top and bottom voider plates move to the closed position, illustrated in Figure 7B, such that the bites **80** compress the tubular covering **15** into the compressed cord **84**. In one embodiment, an air nozzle __ is utilized to direct an air stream towards the loop handle **12** between cycles of operation, when the voider gates are recycled into the retracted position so as to prevent the loop handle **12** from being obstructed by the voider plates.

Further, the apparatus **10** includes a handle formation assembly **90** for engaging the compressed cord **84** of tubular covering and forming the compressed cord **84** into a loop handle **12**. In this regard, a handle formation jaw **92**, actuated by a jaw actuator **93**, and a jaw plate **94**, each having an elongated slot **96** opening outwardly therefrom, are carried by an elongated rod **98** actuated by a dual stage cylinder **99**. The initial position of the handle formation assembly **90** is illustrated in Figures 5 and 6A. When engaged, the dual stage cylinder **99** is fully extended, as seen in Figure 6B and Figure 10, and the handle formation jaw **92** closes on the compressed cord **84**. The second stage of the dual stage cylinder **99** is retracted, see Figure 6C, and the handle jaw cover **100**, which is actuated by cover actuator **102** is extended so as to force the compressed cord **84** against the, preferably arcuate, surface of the jaw thereby forming a partial loop, see also Figure 11. The handle formation jaw **92** is rotated 180 degrees, see Figure 6D, preferably by a rotary actuator **104**, and the jaw cover is retracted, see Figure 6E. As seen in Figure 5A, 15 and 16, the clipper device **105**, which is carried by the frame of the apparatus **10** in spaced relation from the handle formation assembly, rotates into a position to engage, and be received by, the slot **96** disposed in the handle formation assembly **90**, thus engaging the compressed cord **84** of tubular covering **15**. The clipper device **105** secures two clips to the compressed cord **84**, one to secure the bottom of the tubular covering for the food product **16** being covered, and one to secure the loop handle, (and tag if desired), for the tubular covering **15** in preparation of receiving a subsequent food product to be covered. Further a clipping knife severs the compressed cord **84** of tubular covering at a point disposed between the two securing clips. As described above, the product restraining assembly **65** is provided to capture and restrain the food product as it passes through the voider gate assembly, see Figure 8A, position the covered food product for clipping, see Figure 8B and to release the food product upon completion of the apparatus's handle formation and clipping cycle, see Figure 8C. A flow diagram showing the steps of operation of the apparatus **10** is set forth in Figures 4, 4A, 4B and 4C.

[0015] As seen in the drawings the clipping device **105** is configured with both clip rail assemblies **108** and **110** disposed on the same side of the clipping device **105**, a novel arrangement contrary to a conventional clipping device having a clip rail assembly disposed

on each side of the clipping device. Placement of both clip rail assemblies **108** and **110** on one side of the clipping device, i.e. opposite the side **106** which cuts the compressed cord **84** of the tubular covering **15**, allows for extremely close tolerances between the cutting side **106** of the clipping device **105** and the moveable set of voider gates **50**, therefore a desirable tight package can be obtained. Except for the novel placement of clip rail assemblies **108** and **110**, the clip rail assemblies are conventional clip rail assemblies as will be readily understood by those skilled in the art. In order to accommodate this novel arrangement, the clip rail assembly **108** that supplies clips to the opposite side of the clipping device **105** is angled as best illustrated in Figure 18. As is known in the art, the clips are punched in a manner that causes the legs of the clips to be substantially parallel to one another. As can be seen in Figure 17A, the first clip die **114** which is formed in a conventional manner, in which the punch **116** and the die **114** lie in substantially the same plane as the side of the clipping device while the grooves **118** formed in the clip die are at a selected angle relative to the plane of the side of the clipping device, this angling of the grooves **118** in the clip die **114** allows the desired bending of the clip legs. However, in order to accommodate the clips that are fed into the opposite side of the clipping device **105**, and at an angle relative to the side **106** of the clipping device **105**, the punch **122** is angled as can be clearly seen in Figure 17B. Accordingly, as can be seen in Figure 17B, the second clip die **120** is formed in a novel manner in which the grooves **124** formed in the die are in substantially parallel to the side of the clipping device.

From the foregoing description, it will be recognized by those skilled in the art that a device for defining a loop handle in a tubular covering for a food product, offering advantages over the prior art has been provided. In this regard, the handle forming device automates a process that has heretofore been accomplished by hand labor.

While the present invention has been illustrated by description of several embodiments and while the illustrative embodiments have been described in considerable detail, it is not the intention of the applicants to restrict or in any way limit the scope of the appended claims to such detail. Additional advantages and modifications will readily appear

to those skilled in the art. The invention in its broader aspects is therefore not limited to the specific details, representative apparatus, and illustrative examples shown and described. Accordingly, departures may be made from such details without departing from the spirit or scope of applicants' general inventive concept.